

Automatic Identification of Land Uses from  
ERTS-1 Data Obtained Over Milwaukee, Wisconsin

Discipline Category: 2A Land Use Classification  
ERTS Frame Number: 101716093, obtained on 9 August 1972  
Run Number: 72032800 Classification Serial Number: 1128243406  
ERTS Contract Number: NAS5-21785

Introduction

ERTS-1 Frame No. E-1017-16093 CCT data were received by Purdue University on 12 October. Although there were a few scattered clouds in the data most of the frame was suitable for analysis. The area covered included a variety of land uses, ranging from rich agricultural land (the area is part of both the Corn Belt and Dairy Belt) to recreation areas (e.g., the Kettle Moraine), to large urban complexes such as Chicago and Milwaukee County, was chosen for this analysis. The purpose of this investigation was to identify earth surface features in an urban/suburban environment.

Procedure

After the data from the designated study area were reformatted, a preliminary classification was produced, using the clustering algorithm. Milwaukee County was classified using the LARSYSAA package of computer programs. Natural vegetation (open, grassy areas and woodland) was best identified using a non-supervised program, requiring a minimal amount of researcher intervention. Water, bare soil and cultural features were classified by techniques requiring the choice of data training sets for the computer.

Ground observation data consisted of a 1963 land use map (published by the S.E. Wisc. Planning Com.), the U.S.G.S. topographic quadrangle for Milwaukee and vicinity (1958, 7.5 minute series), and current petroleum industry road maps.

Significant Results

Spectrally, thirteen classes of ground cover were identified within Milwaukee County: five classes of water, grassy (open) areas, beach, two classes of road, woods, suburban, inner city, and industry.

A distinct, concentric pattern of land use was identified in Milwaukee County, radiating outward (north, west, and south) from the Central Business District. The first ring has a principal feature, termed the inner city, which is indicative of the older part of Milwaukee County. Bounded roughly by Burleigh Street on the north, Cleveland Avenue on the south, 60th Street on the west, and Lake Michigan on the east, this area correlates closely with the extent of multiple-family dwelling units. Such units are typically the "two-feet" type of structure, a great many of which were constructed prior to 1930. Industrial complexes are also a prominent land use in the first ring.

In the next ring (Good Hope Road on the north, College Avenue on the south, and 124th Street on the west), the land use becomes more complex, consisting of suburban areas (some of which are wooded), parks, and varied institutional features (universities, cemeteries, state fair grounds, etc.). Nonetheless, the suburban residential area is the dominant areal feature.

The third general ring consists primarily of open, grassy land, with scattered residential subdivisions, woodlots, and small water bodies.

The five classes of water identified suggest differences in depth, turbidity, and/or color. A number of major roads were identified, including Interstate 94, 894, and 794; Forest Home Avenue, Loomis Road, National Avenue, Fond du Lac Avenue, Appleton Avenue, and U.S. 141. Other spectrally identifiable features included the larger county parks (e.g. Lincoln and Washington parks) and larger cemeteries.

Date Submitted: December 8, 1972

